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H2E ECBX ECSD  
H1B B210C2C

(56) Documents Cited

GB 2325333 A US 5246790 A US 4142026 A

(58) Field of Search

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INT CL<sup>7</sup> H01M 2/10, H01R 13/66 27/02 31/06 33/94,  
H02J 7/00

(54) Abstract Title

Battery adapter

(57) A battery adapter (1) enables the use of a small size battery, such as an AA size battery (4), in a battery compartment designed to receive a larger battery, such as a D size battery. The battery adapter (1) has a two-part casing (11, 12) with an annular wall (121) formed in the base of the lower casing (12) to receive and support the small size battery (4). The negative pole of the battery (4) is engaged with a helical spring (123) conductively connected to a negative plate (122). A positive pole (5) is inserted into the adapter casing (11, 12) to contact the positive pole of the battery (4). A number of differently sized battery adapters may also be arranged one within the other whereby, for example, an AAA size battery may be used where a D size battery is required.

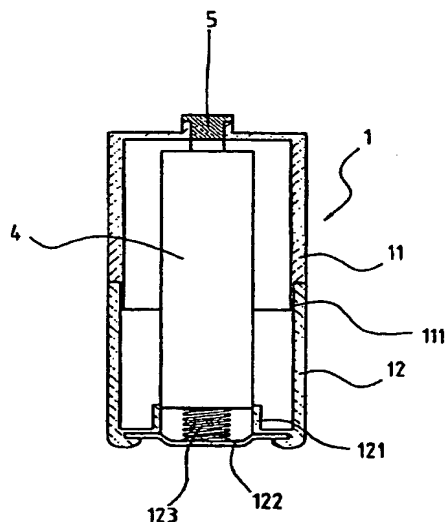


FIG. 5

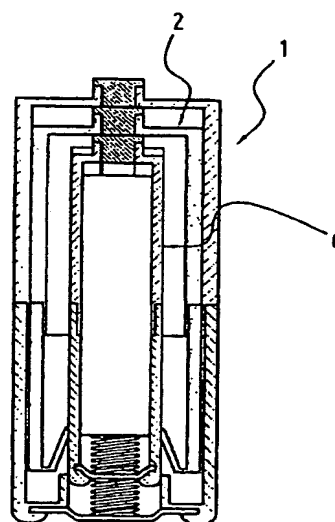


FIG. 11

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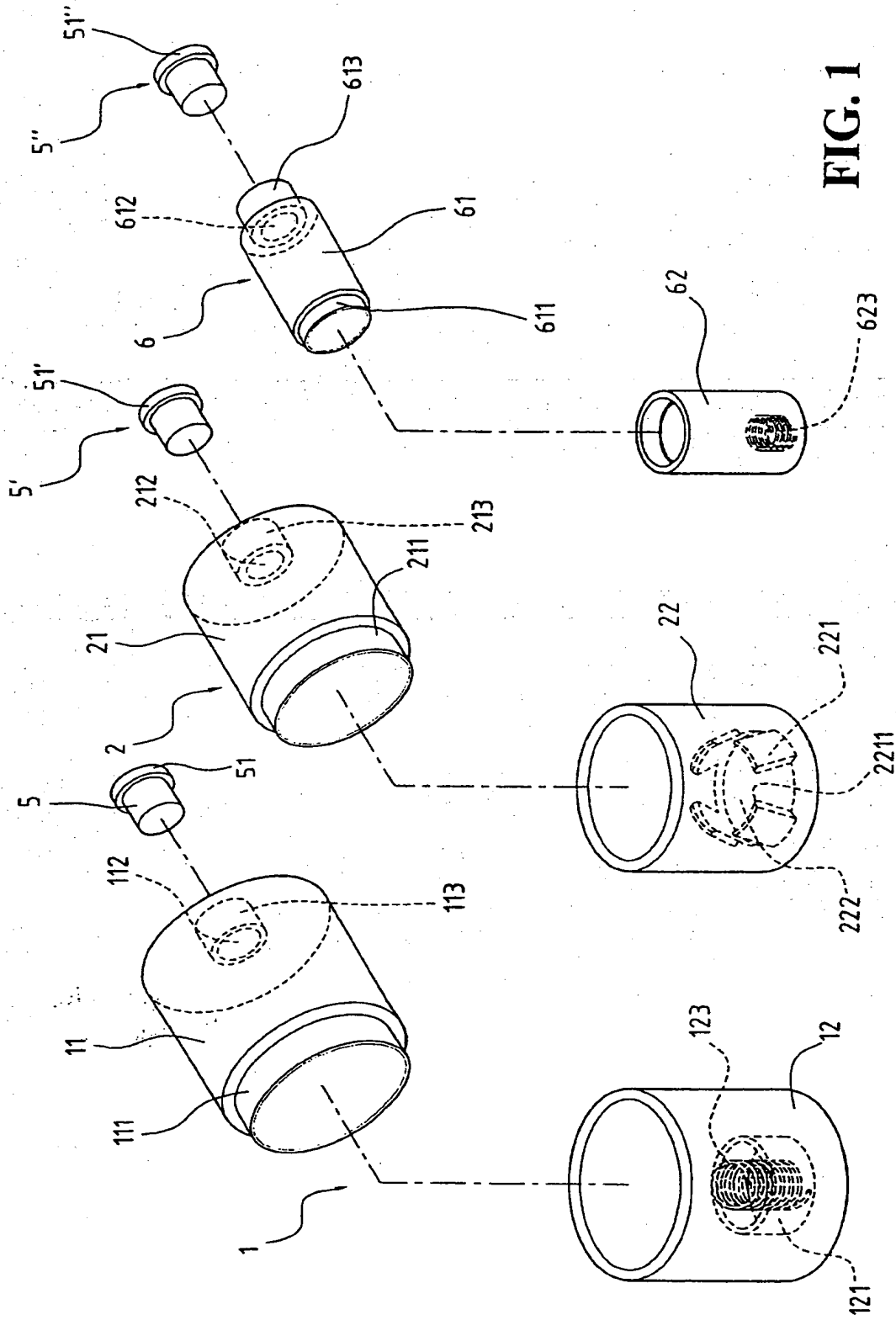
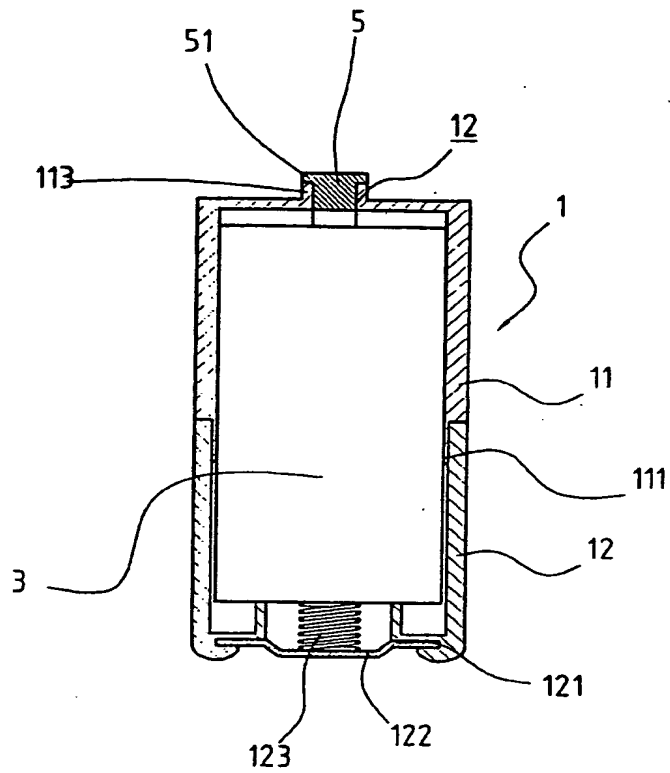


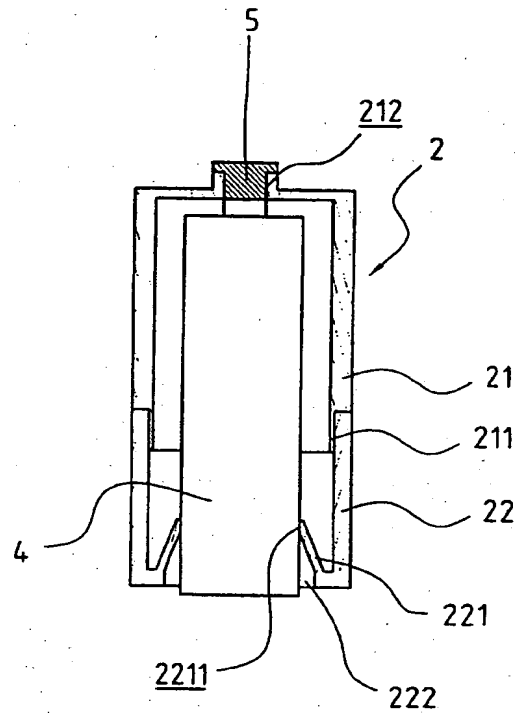
FIG. 1

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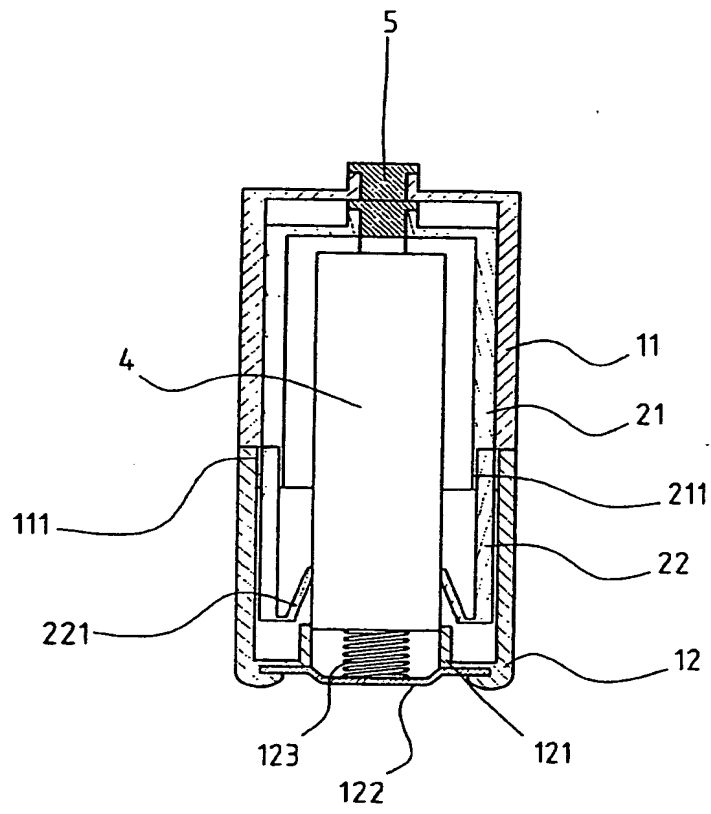
**FIG. 2**

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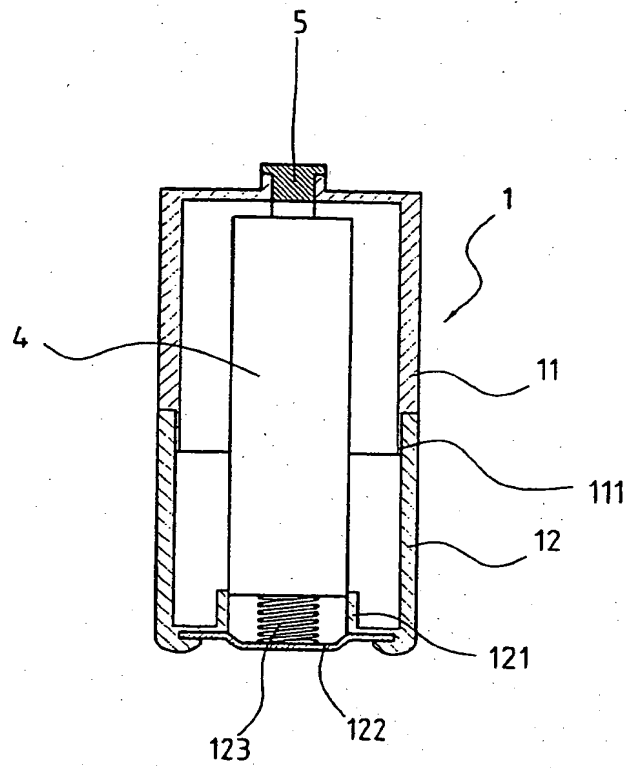
**FIG. 3**

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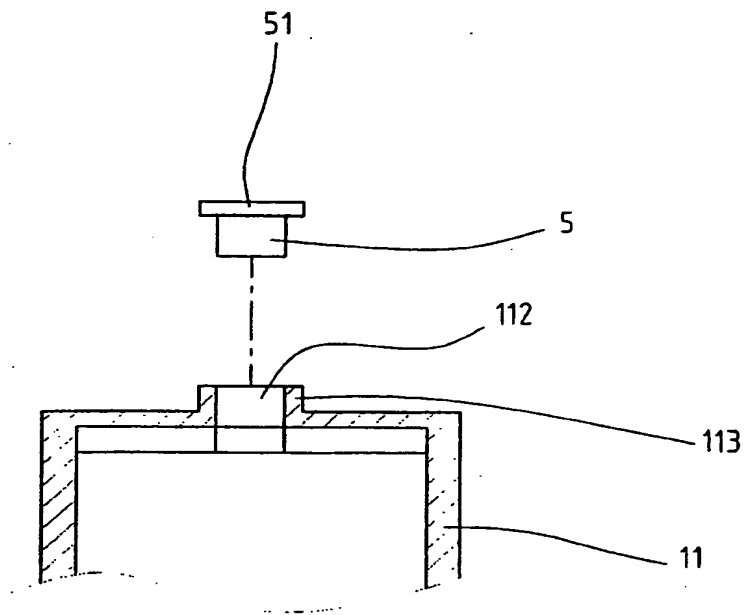
**FIG. 4**

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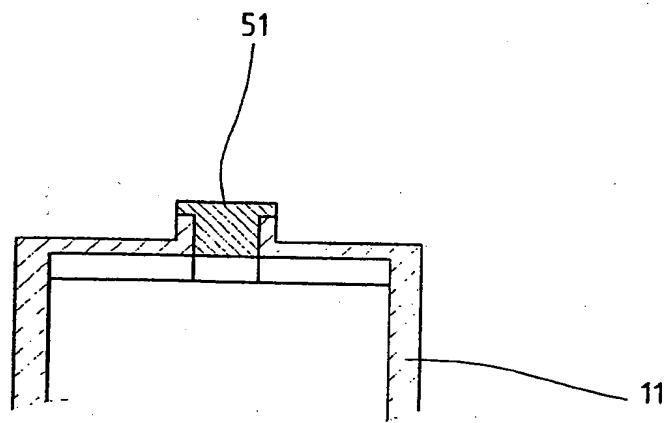
**FIG. 5**

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**FIG. 6**

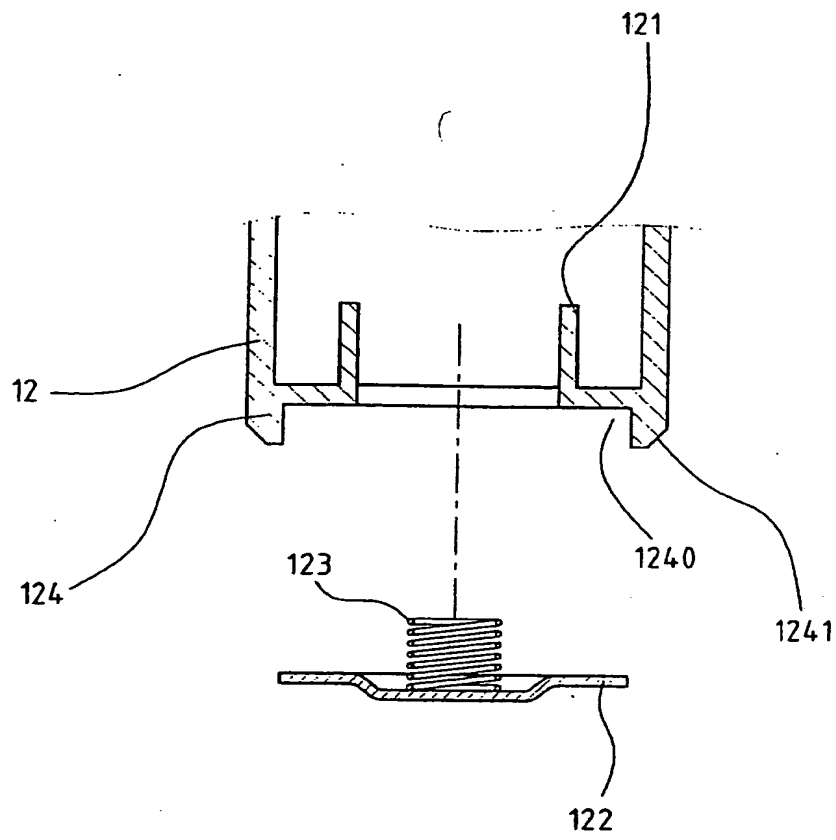
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**FIG. 7**

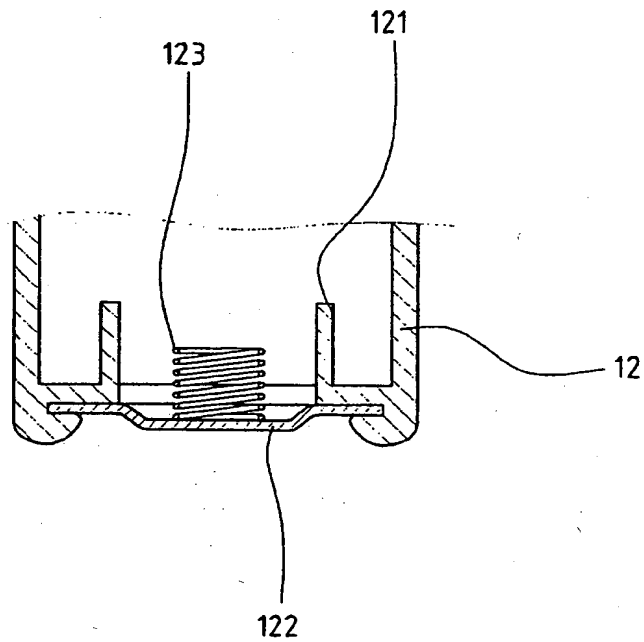


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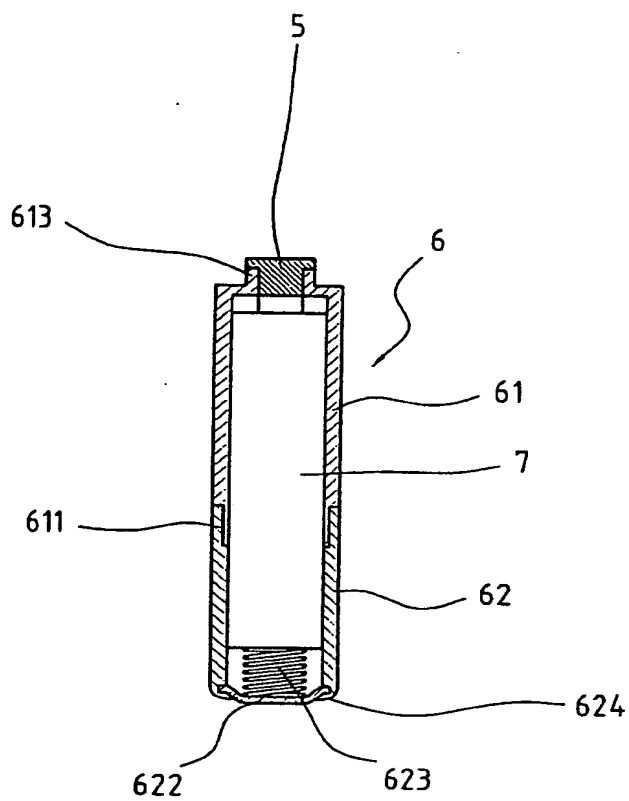
**FIG. 8**

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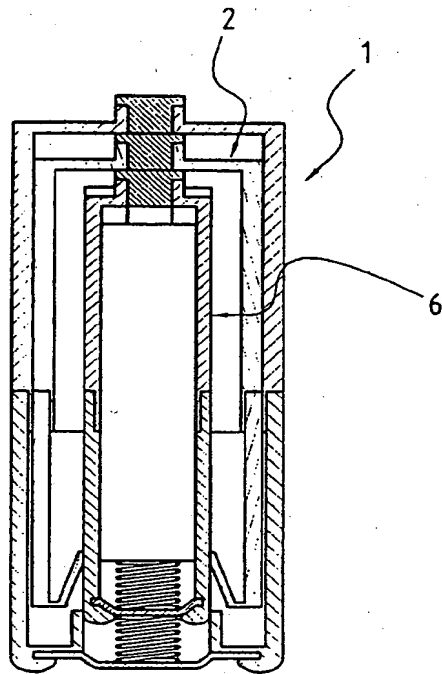
**FIG. 9**

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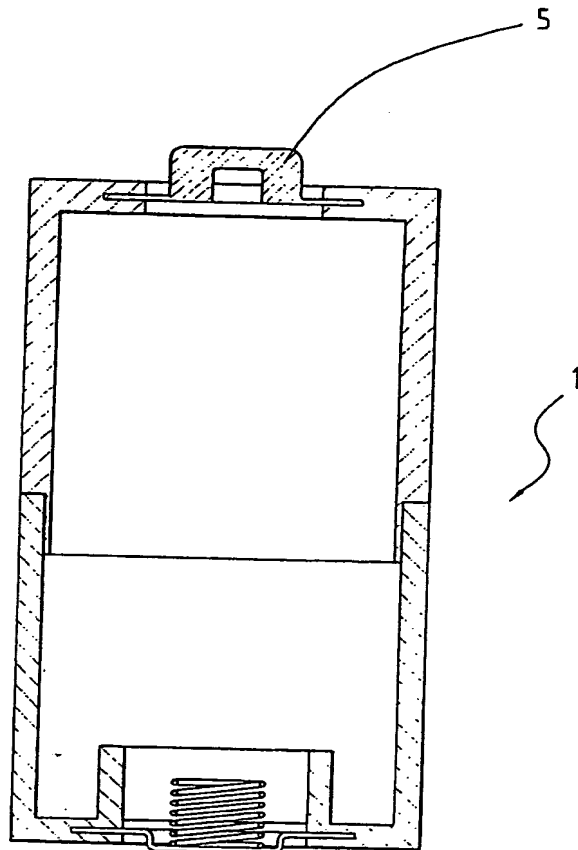
**FIG. 10**

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**FIG. 11**

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**FIG. 12**

## BATTERY ADAPTER

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

5 The present invention relates to a battery adapter and more particularly to a battery adapter which is able to adapt to different size of battery compartment, such that a small size battery is able to be used as a large size battery, which facilitates the user of different sizes of batteries.

#### 2. Description of Related Art

10 The commonly known batteries generally are divided as AAA battery, AA battery, C size battery and D size battery, whose diameter and current capacity increases as the size becomes bigger. Normally, the electrical appliance which uses batteries as the source of power will have its own battery compartment fitted for a suitable battery or batteries, wherein the battery compartment is the biggest for receiving the D size battery, the battery compartment for the C size battery is the  
15 second and so on. Nowadays, due to the outcry of the environmental conservation group, people are encouraged to use the rechargeable battery to avoid the pollution to the environment. However, the common situation is that when a suitable battery is used up and there is no backup battery at hand. What is left is the battery of another size, which can not be fitted into the originally designed battery  
20 compartment to engage with the electrical contact. This kind of situation happens to almost every one and it brings a lot of trouble to the users.

It is the primary objective of the invention to provide a battery adapter to mitigate and obviate the aforementioned problems.

### SUMMARY OF THE INVENTION

25 The objective of the invention is to provide a battery adapter, which is able to use a small size battery as a large size battery.

Another objective of the invention is to provide a battery adapter having an AA battery adapter, a C size battery adapter and a D size battery adapter.

Still another objective of the invention is to provide a battery adapter, wherein the AA battery adapter and the C size battery adapter are able to be received in the  
5 D size battery adapter so as to reduce the overall size of the battery adapter.

According to one aspect of the invention, the AA battery adapter, C size battery adapter and the D size battery adapter are respectively composed of a lower casing and an upper casing, such that the AAA battery is able to be received in the lower casing of the AA battery adapter, then the lower casing of the AA battery  
10 adapter engages with the upper casing to become an AA battery for use. Furthermore, the AA battery or the C size battery is able to directly or indirectly be received in the lower casing of the D size battery adapter to be used as the D size battery. With such an arrangement, the use of battery will be facilitated and the disposal of wasted battery will be greatly reduced.

15 Still, another objective of the invention is to provide a battery adapter, wherein when the AAA battery is received in the AA battery adapter, the AA battery adapter is then able to be received in the C size battery adapter. Later on, the C size battery adapter having the AA battery adapter received therein is able to be received in the D size battery adapter to be used as a D size battery.

20 Other objects, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an exploded perspective view of an AA battery adapter, a C size  
25 battery adapter and a D size battery adapter in accordance with the invention;

Fig. 2 is a sectional view showing a C size battery is received in the D size

battery adapter to function as a D size battery;

Fig. 3 is a side view in partial section, wherein an AA battery is received in the C size battery adapter to function as a C size battery;

Fig. 4 is a side view in partial section, wherein the C size battery adapter as shown in Fig. 2 is received in a D size battery adapter to function as a D size battery;

Fig. 5 is a side view in partial section, wherein the AA battery is able to be directly received in the D size battery adapter to function as a D size battery;

Fig. 6 is an exploded plan view showing that a positive pole is about to be mounted on an upper casing of a battery adapter;

Fig. 7 is a side view in cross section, which shows that the positive pole in Fig. 6 is mounted on the battery adapter;

Fig. 8 is an exploded plan view showing that a negative plate is about to be mounted on a lower casing of a battery adapter;

Fig. 9 is a side view in cross section showing that the negative plate in Fig. 8 is mounted in the lower casing of the battery adapter;

Fig. 10 is a side view in partial section, wherein an AAA battery is received in the AA battery adapter to function as an AA battery;

Fig. 11 is a side view in partial cross section, wherein the AA battery adapter and the C size battery adapter are sequentially received in the D size battery adapter to function as a D size battery; and

Fig. 12 is a cross sectional view showing another preferred embodiment of the invention, wherein the positive pole and the negative plate are integral parts of the upper casing and the lower casing respectively.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

With reference to Fig. 1, it is to be noted that the battery adapter in accordance



with the present invention has a D size battery adapter (1), a C size battery adapter (2) and an AA battery adapter (6). The D size battery adapter (1) has an upper casing (11) provided with a flange (111) extending out from a peripheral edge thereof and a through hole (112) defined in a tube (113) protruding out from a peripheral edge opposite to that of the flange (111) to receive therein a positive pole (5) having a head (51) with a diameter larger than that of the tube (113) thereby allowing the insertion of the positive pole (5) into the through hole (112) (as shown in Fig. 2, Fig. 6 and Fig. 7) and a lower casing (12) with an inner diameter slightly larger than that of the flange (111), such that the lower casing (12) is able to receive the flange (111) of the upper casing (11) when the upper casing (11) engages with the lower casing (12). The lower casing (12) has an end provided with an annular wall (121) designed to have an AA battery (not shown) fitted therein and having a conductive helical spring (123) securely mounted on a bottom face in the annular wall (121). The lower casing further has a negative plate (122) to seal the bottom face of the lower casing (12). The negative plate (122) has a conductive element (123), such as a spring or any other element having the same feature, securely mounted thereon. To have the negative plate (122) securely mounted on the bottom face of the lower casing (12), the lower casing (12) is provided with an annular flange (124) with a wedged side face (1241). Because of the formation of the annular flange (124) and the wedged side face (1241), a recess (1240) is thus defined to snugly receive the negative plate (122) therein, as shown in Fig. 8. After the negative plate (122) is received in the recess (1240), the annular flange (124) is deformed by any appropriate method known in the art to allow the annular flange (124) to move inward toward the center of the lower casing (12) so as to position the negative plate (122) as well as the conductive element (123) in the bottom face of the lower casing (12).

The C size battery adapter (2) has an upper casing (21) having a diameter designed to receive therein an AA battery and a flange (211) extending out from a peripheral edge thereof and a through hole (212) defined in a tube (213) protruding out from a peripheral edge opposite to that of the flange (211) to receive therein a positive pole (5') having a head (51') with a diameter larger than that of the tube (213) thereby allowing the insertion of the positive pole (5') into the through hole (212) and a lower casing (22) having a plurality of resilient plates (221) each inclined toward the center thereof and provided with an inclined face (2211) in a free edge of the resilient plate (221), a hole (222) defined among the resilient plates (221) and having a diameter designed to allow the insertion of the AA battery and being larger than that of the annular wall (121) of the lower casing (12) of the D size battery adapter (1). A diameter formed among the plurality of resilient plates (221) is designed to be smaller than that of an AA battery (3) (as shown in Fig. 3).

The AA battery adapter (6) has an upper casing (61) with a diameter for receiving therein an AAA battery (7) and provided with a flange (611) extending out from a peripheral edge thereof and a through hole (612) defined in a tube (613) protruding out from a peripheral edge opposite to that of the flange (611) to receive therein a positive pole (5'') having a head (51'') with a diameter larger than that of the tube (613) thereby allowing the insertion of the positive pole (5'') into the through hole (612) and a lower casing (62) having a negative plate (622) to seal the bottom face of the lower casing (62). The negative plate (22) has a conductive element (623), such as a spring or any other element having the same feature, securely mounted thereon. To have the negative plate (622) securely mounted on the bottom face of the lower casing (62), the lower casing (62) is provided with an annular flange (624). Because of the formation of the annular flange (624), a recess (not shown) is thus defined to snugly receive the negative plate (622) therein, as

shown in Fig. 3. After the negative plate (622) is received in the recess, the annular flange (624) is deformed by any appropriate method known in the art to allow the annular flange (624) to move inward toward the center of the lower casing (62) so as to position the negative plate (622) as well as the conductive element (623) in the  
5 bottom face of the lower casing (62).

With such an arrangement, when a C size battery (3) is to be used as a D size battery (not shown), the C size battery (3) is first received in the lower casing (12) of the D size battery adapter (1) with the negative pole (not numbered) of the C size battery (3) engaging with the helical spring (123). Then, the upper casing (11)  
10 engages with the lower casing (12) with the flange (111) received in the lower casing (12), whereby the positive pole (not numbered) of the C size battery (3) engages with the positive pole (5) of the upper casing (11), as shown in Fig. 2, and the C size battery (3) is ready to be used as a D size battery.

When an AA size battery (4) is to be used as a C size battery, the negative pole  
15 (not numbered) of the AA size battery (4) is first received between the resilient plates (221) of the C size battery adapter (2). Because each of the resilient plates (221) have the inclined face (2211) formed on a free edge thereof, when the AA size battery (4) is received between the resilient plates (221), the resilient plates (221) will be forced to open to allow the AA size battery (4) to be positioned  
20 therebetween with the negative pole of the AA size battery (4) extending out from the hole (222). Thereafter, the flange (211) is received in the lower casing (22) to allow the positive pole of the AA size battery (4) to engage with the positive pole (5') of the upper casing (21). After the AA size battery (4) is secured in the C size battery adapter (2), the AA size battery (4) is ready to be used as a C size battery.  
25 Consequently, the C size battery adapter (2) with the AA size battery (4) received therein is able to be received in the D size battery adapter (1) with the positive pole

(5') of the C size battery adapter (2) engaging with the positive pole (5) of the D size battery adapter (1) and the negative pole of the AA size battery (4) engaging with the helical spring (123), as shown in Fig. 4, such that the AA size battery (4) is ready to be used as the D size battery. However, instead of indirectly using the size  
5 AA battery (4) as a D size battery, using the structure of the present invention is able to insert the AA size battery (4) directly into the lower casing (12) of the D size battery adapter (1) with the negative pole of the AA size battery (4) received in the annular wall (121) to allow the negative pole of the AA size battery (4) engaging with the helical spring (123). After which, the upper casing (11) engages with the  
10 lower casing (12) with the flange (111) received in the lower casing (12), whereby the positive pole (5) of the upper casing (11) engages with the positive pole of the AA size battery (4), such that the AA size battery (4) is ready to be used as a D size battery, as shown in Fig. 5.

With reference to Fig. 10, when an AAA battery (7) is about to be used as the  
15 AA battery (4), the AAA battery (7) is first received within the lower casing (62) of the AA battery adapter (6) and the upper casing (61) engages the lower casing (62) with the flange (611) received in the lower casing (62). After the assembly of the AA battery adapter (6), the positive pole (5'') of the AA battery adapter (6) engages with the positive pole of the AA battery (7) and the negative plate (623) engages  
20 with the negative pole of the AAA battery (7). Thus, the AAA battery (7) is ready to be used as the AA battery.

Thus, it is to be noted from the above description that the AAA battery (7) can be used as the AA battery, the C size battery or the D size battery, the AA battery can be used as the C size battery or the D size battery and the C size battery can be  
25 used as the D size battery. furthermore, for facilitating storage, the AA battery adapter (6) can be received in the C size battery adapter (2) and the C size battery

adapter is able to be received in the D size battery adapter (1), which reduces the space dramatically, as shown in Fig. 11.

With reference to Fig. 12, the positive pole (5) of the D size battery adapter (1) is made to be an integral part thereof, which can also achieve the above mentioned  
5 objective.

From the above description, it is noted that the invention has the following advantages:

1. simple structure:

Because the structure is simple, the manufacturer is able to produce the  
10 product at a lower cost.

2. labor efficient:

Because of the simple structure, workers do not have to spend excessive time to assemble the invention.

3. easy to operate:

15 Insertion of the AAA battery into the AA battery adapter, the AA battery into the C size battery adapter or the C size battery into the D size battery adapter is quite simple and thus the operation of switching the battery of one size into more bigger diameter of another battery of another size is easy to be finished.

It is to be understood, however, that even though numerous characteristics and  
20 advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended  
25 claims are expressed.

**WHAT IS CLAIMED IS:**

1        1. A battery adapter comprising:

2        a D size battery adapter having

3            an upper casing (11) provided with a through hole (112) defined in a tube  
4        (113) protruding out from a peripheral edge opposite to that of the flange (111)  
5        to receive therein a positive pole (5) having a head (51) with a diameter larger  
6        than that of the tube (113) thereby allowing the insertion of the positive pole (5)  
7        into the through hole (112); and

8            a lower casing (12) provided with an inner diameter slightly larger than  
9        that of the flange (111) so as that the flange (111) of the upper casing (11) is  
10       able to be received in the lower casing (12), the lower casing having an end  
11       provided with an annular wall (121) designed to have an AA battery fitted  
12       therein, a conductive helical spring (123) securely mounted on a bottom face  
13       in the annular wall (121) and a negative plate (122) mounted to seal the bottom  
14       face of the lower casing (12), the negative plate (122) having a conductive  
15       element (123) securely mounted thereon;

16       a C size battery adapter (2) detachably received in the D size battery adapter  
17       and having

18            an upper casing (21) with a diameter designed to receive therein an AA  
19        battery and a through hole (212) defined in a tube (213) protruding out from a  
20        peripheral edge opposite to that of the flange (211) to receive therein a positive  
21        pole (5') which has a head (51') with a diameter larger than that of the tube  
22        (213) thereby allowing the insertion of the positive pole (5') into the through  
23        hole (212); and

24            a lower casing (22) having a plurality of resilient plates (221) each  
25        inclined toward the center thereof and provided with an inclined face (2211) in

26 a free edge of the resilient plate (221) to securely receive therebetween an AA  
27 battery, a hole (222) defined among the resilient plates (221) and having a  
28 diameter designed to allow the insertion of the AA battery and being larger  
29 than that of the annular wall (121) of the lower casing (12) of the D size battery  
30 adapter (1); and

31 a AA battery adapter (6) detachably received in the C size battery adapter and  
32 having

33 an upper casing (61) with a diameter for receiving therein an AAA battery  
34 (7) and provided with a through hole (612) defined in a tube (613) protruding  
35 out from a peripheral edge opposite to that of the flange (611) to receive  
36 therein a positive pole (5'') having a head (51'') with a diameter larger than that  
37 of the tube (613) thereby allowing the insertion of the positive pole (5'') into  
38 the through hole (612); and

39 a lower casing (62) having a negative plate (622) to seal the bottom face  
40 of the lower casing (62), the negative plate (22) having a conductive element  
41 (623) securely mounted thereon.

1 2. The battery adapter as claimed in claim 1, wherein the upper casing (11) of  
2 the D size battery adapter (1) has a flange (111) extending out from a peripheral  
3 edge thereof and having a diameter slightly smaller than that of the lower casing  
4 (12) so as to allow the flange (111) to be received in the lower casing (12) when the  
5 upper casing (11) engages with the lower casing (12).

1 3. The battery adapter as claimed in claim 1, wherein the upper casing (21) of  
2 the C size battery adapter (2) has a flange (211) extending out from a peripheral  
3 edge thereof and having a diameter slightly smaller than that of the lower casing  
4 (22) so as to allow the flange (211) to be received in the lower casing (22) when the  
5 upper casing (21) engages with the lower casing (22).

1        4. The battery adapter as claimed in claim 1, wherein the upper casing (61) of  
2        the AA battery adapter (6) has a flange (611) extending out from a peripheral edge  
3        thereof and having a diameter slightly smaller than that of the lower casing (62) so  
4        as to allow the flange (611) to be received in the lower casing (62) when the upper  
5        casing (61) engages with the lower casing (62).

1        5. The battery adapter as claimed in claim 1, wherein the resilient plates (221)  
2        of the C size battery adapter are integral parts of the lower casing (22).

1        6. The battery adapter as claimed in claim 5, wherein the resilient plates (222)  
2        each have an inclined face (2211) inclined toward the center of the lower casing  
3        (22)



7. A battery adapter comprising an elongate, tubular casing formed by two interengaged casing parts, the casing supporting a negative plate at one end and a positive plate at the other, wherein the casing and its negative and positive plates is substantially the same size and shape as a conventional battery, and  
5 wherein support means are provided internally of said casing to support a battery, which is smaller in size than the casing, within the casing such that the positive and negative poles of the battery are maintained in conductive contact with the positive and negative plates of said casing.
- 10 8. A battery adapter as claimed in Claim 7, wherein said support means comprises resilient means.
9. A battery adapter substantially as hereinbefore described with reference to the accompanying drawings.



INVESTOR IN PEOPLE

Application No: GB 0006164.8  
Claims searched: 1 - 9

Examiner: Paul Nicholls  
Date of search: 26 June 2000

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.R): H2E (ECSD, ECBX); H1B

Int CI (Ed.7): H01R 13/66, 27/02, 31/06, 33/94; H01M 2/10; H02J 7/00

Other:

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2,325,333 A (PARKES) - See figure 5	7, 8
X	US 5,246,790 A (MOONEY et al) - See figure 1 and 2	7, 8
X	US 4,142,026 A (ZORDAN) - See whole document	7, 8

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.